IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application

Carlin *et al.*

Application Number: 09/457,724

Filed December 10, 1999

For: WIDEBAND COMMUNICATION INTERCEPT AND DIRECTION FINDING DEVICE USING HYPERCHANNELIZATION

Attorney Docket No. ARGO.0001

Honorable Assistant Commissioner for Patents

Washington, D.C. 20231

Art Unit 2631

Examiner Corrielus, Jean B.

DECLARATION OF INVENTOR(S) UNDER 37 C.F.R.§1.132

Sir:

We, Joe Carlin and Robert Kellogg are among the inventors of the above identified application and experts in the field of the invention claimed in the above identified application, and hereby declare as follows:

We currently work for the Assignee, ARGON ENGINEERING ASSOCIATES. Joe Carlin received his BSEE and BSCS degree at University of Maryland, MSEE degree at Johns Hopkins University, and MBA degree at Georgetown University; Robert Kellogg received his BS degree at University of Southern California, MS degree at Case Institute of Technology, and second MS degree in Systems Technology and PhD degree in Applied Physics from the Naval Postgraduate School.

We have reviewed the above-referenced patent application and carefully considered the Examiner's rejection based upon U.S. Patent No. 6,229,998 to Hamdy et al. (hereinafter "Hamdy"), and U.S. Patent No. 5,260,968 to Gardner et al. (hereinafter "Gardner"), and it is our conclusion that the invention has sufficient teachings for implementing hyperchannelization that operates with a maximum 30% the bandwidth of expected signals. Specifically, it is our opinion that someone of skill in the art would not be able to implement the claimed invention in view of Hamdy or Gardner.

For arbitrary narrowband signals in the RF environment, the object of the claimed FFT hyperchannelization is to create complex spectral components that are much narrower than any arbitrary signal of interest bandwidth. For example, if the smallest signal expected in the environment is 1 kHz bandwidth, FFT hyperchannelization is required using 330 Hz bandwidth. If the smallest signal is 10 kHz, then hyperchannelization at 3 kHz bandwidth is minimally required. In all cases, hyperchannel components are examined in arbitrary subsets for signal presence and same arbitrary subset combining to reconstruct the signal of interest from available FFT hyperchannels.

Detection of a narrowband signal depends on signal presence in multiple adjacent FFT hyperchannels in both time and frequency. For a signal of arbitrary bandwidth, not only are the time averages (short, medium, long, and delayed long) used on individual hyperchannel spectral components, but adjacent active hyhperchannel components are used collectively by detection means to declare the presences of new signal energy, with an estimate of signal bandwidth based on the number of adjacent active hyperchannels.

The set of active hyperchannels forms spectral signal data of an arbitrary bandwidth used by demodulation/recognition processor means, direction finding means and beamforming means for signal recognition, demodulation, direction finding, and beam forming. c.f. page 34, lines 4 -21 of the specification of the invention giving an example of 11 adjacent hyperchannels of signal activity used by synthesis filter to output time-domain data to a plurality of synthesis filter receivers.

Neither Hamdy nor Gardner recite hyperchannelization for arbitrary signal detection and combining that operates with at maximum 30% the bandwidth of the arbitrary narrowband signal.

Gardner in Col. 11, Lines 27-31 describes the maximum number of users (L) that can be accommodated as specified in his equation (8) using a reuse factor (r), total system bandwidth (B_t), signal bandwidth (B_c) and signal separation, (f_{sep}). Gardner does not quantify the frequency reuse factor (r), nor FFT channelization bandwidth, but gives an example in Col. 11, Lines 35-36 where a signal (B_c) is 32 kHz and signal carrier separation (f_{sep}) is 1 kHz. Gardner goes on to say in Col. 11, Line 36 that this channelization scheme requires "at least 63 antenna elements," i.e., M antenna elements where $M>K=(B_c/f_{sep}-1)$. The FFT hyperchannelization according to the invention requires at least one antenna element.

Gardner in Col. 11, Lines 1-3 describes his channelization and processing invention applicable only to BPSK signals. The FFT hyperchannelization according to the invention is applicable to any arbitrary narrowband signal such that it can be detected and recombine from some arbitrary subset of adjacent hyperchannels.

Based on the above analysis, we contend that clear and distinct differences as discussed exist between the present invention and Gardner.

We, Joe Carlin and Robert L. Kellogg, hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statement were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-captioned application and any patent to issue thereon.

Respectfully submitted this 16th day of June, 2003

Joe Carlin

Robert L. Kellogg